

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Request by Piper Networks, Inc.)	ET Docket No. 19-246
For Waiver of Sections 15.250(c)-(d) and)	
15.519(a) of the Commission's Rules)	
)	
)	

COMMENTS OF AVIATION SPECTRUM RESOURCES, INC.

Aviation Spectrum Resources, Inc. (“ASRI”), by its attorney and pursuant to the September 3, 2019, Public Notice in the above–referenced matter,¹ hereby comments on the June 6, 2019, waiver request (the “Request”) of Piper Networks, Inc. (“Piper”). Piper seeks waiver of Sections 15.519(a)(2) and 15.250(c)-(d) of the Commission’s Rules² to allow it to obtain a grant of equipment authorization to permit marketing, installation, and operation of its enhanced transit location system (“ETLS”) on outdoor, fixed infrastructure, specifically wayside of rail systems.³ Piper’s ETLS incorporates intentional ultra-wideband (“UWB”) transmitters that would operate in the 3200-3700 MHz, 4243-4743 MHz, and 5925-7250 MHz bands. Contrary to Piper’s plans, the Commission’s Rules require UWB devices to be hand-held and Section 15.519(a)(2) prohibits the use of fixed UWB transmitting antennas mounted on outdoor infrastructure.

ASRI is concerned about the potential for interference from the ETLS installed on outdoor, fixed infrastructure with radio altimeters and Wireless Avionics Intra-Communications (“WAIC”),

¹ Public Notice, *Office of Engineering and Technology Seeks Comment on Piper Networks Inc. Request for Waiver of Part 15 Rules for Enhanced Transit Location System*, ET Docket No. 190246 DA-19-865 (rel. Sep. 3, 2019).

² 47 C.F.R. §§ 15.519(a)(2) and 15.250(c)-(d).

³ *Request* at 6 (there is “no intent to install Piper’s UWB devices in any locations except the wayside of rail systems”).

both of which operate throughout the 4200-4400 MHz band operates and play critical functions in aviation safety. The information provided in the Request is insufficient for assessing the potential impact on these systems. As explained below, ASRI requests additional information from Piper to allow it and the Commission to better understand the potential for harmful interference to critical altimeter and WAIC systems in the 4200-4400 MHz band, which overlaps substantially the frequencies Piper intends for its ETLS to utilize under the requested waiver.

I. INTRODUCTION: AVIATION USE OF THE 4200-4400 MHZ BAND

ASRI is the communications company of the U.S. commercial aviation industry and is owned by the airlines and other airspace users. As sponsor of the Aeronautical Frequency Committee (“AFC”),⁴ ASRI brings together expertise and opinions from across the aviation sector to promote the safe and effective operation of commercial aviation radio communications and navigation systems in use within the US.

The 4200 – 4400 MHz band includes both an allocation for the Aeronautical Radionavigation Service (“ARNS”) and Aeronautical Mobile (R) Service (“AM(RS”).⁵ Within the band, two important aviation safety services operate, on a co-frequency basis, radio altimeters as an ARNS and

⁴ AFC membership includes: Airlines for America, Alaska Airlines, Air Line Pilots Association, American Airlines, Aircraft Operators and Pilots Association, ASRI, The Boeing Company, Bristow Helicopters, Chevron, Collins Aerospace, Delta Airlines, Era Helicopters, Federal Aviation Administration, Federal Express, Frontier Airlines, Harris Corporation, Helicopter Association International, Helicopter Safety Advisory Conference, International Air Transport Association, JetBlue Airways, National Air Transportation Association, PHI, Inc., Société Internationale de Telecommunications Aéronautique, Southwest Airlines, United Airlines, and United Parcel Service.

⁵ See 47 C.F.R. § 2.106; International Telecommunication Union (“ITU”), Final Acts of the 2015 World Radio Communication Conference (WRC-15), Article 5, Table of Frequency Allocations, 2700-4800 MHz (adding a global co-primary AM(R)S allocation at 4200-4400 MHz”); *see also* ITU Radio Regulations, Resolution 424 (Rev.WRC-15).

WAIC as AM(R)S.⁶ Recent domestic and international regulatory activity concerning bands adjacent to 4200-4400 MHz has sensitized aviation to radio altimeter interference, with current testing being conducted to further refine interference models for avionics.

The aviation industry is particularly concerned with protection of the radio altimeters given their critical role in aircraft navigation. The radio altimeter is a vital sensor during all stages of flight and usage is particularly significant during the most dangerous portions of flight: approach and take-off. Without a functioning radio altimeter to provide accurate vertical position and obstacle avoidance information, aircraft will not be able to fly in all-weather conditions, certain approaches, or even at night. Radio altimeter measurements, important for all aviation, are especially critical for helicopters which have a variety of missions that involve operations at low altitudes, often over uneven terrain, in a variety of environments.⁷

Of further concern to aviation operators in the 4200-4400 MHz Band are adequate protections for new aviation WAIC systems that support wireless internal aircraft communications and contribute materially to safe and reliable aircraft operations. Developers, manufacturers, and aviation operators are relying on the allocation for implementation of WAIC applications. These are the only frequencies set aside for WAIC and were adopted by the United States domestically after

⁶ ITU Radio Regulations, 5.436 (Rev.WRC-15) (“Use of the frequency band 4 200-4 400 MHz by stations in the aeronautical mobile (R) service is reserved exclusively for wireless avionics intra-communication systems that operate in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution 424 (WRC-15).”)

⁷ See Comments of Garmin International, Inc., GN Docket No. 18-122, *et al.*, at 6-7 (Oct. 29, 2018) (explaining that radio altimeters are now mandatory safety-of-life equipment for helicopter operations and support critical situational awareness during helicopter hover and landing).

following a 2015 World Radiocommunication Conference decision designating the band for WAIC internationally.⁸

II. THE POTENTIAL FOR HARMFUL INTERFERENCE TO AVIATION SAFETY SYSTEMS FROM THE PROPOSED UWB CO-CHANNEL OUTDOOR FIXED INFRASTRUCTURE ETLs OPERATIONS AT 4243-4743 MHz IS NOT SUFFICIENTLY UNDERSTOOD TO PERMIT THE REQUESTED WAIVER

Interference from in-band UWB waveforms like those described for Piper's proposed ETLs can cause desensitization of radar altimeters due to increased noise levels, and that concern is elevated where diagnostic signals are continuously transmitting on the wayside stationary tracks, i.e., outdoor fixed infrastructure, as Piper intends. The loss of sensitivity from raising the noise floor can degrade altimeter tracking performance during the most critical phases of flight, take-off and approach and landing. Any loss-of-lock conditions during these flight stages, and indeed during all stages of flight, can incidentally cause undesirable effects in other aircraft systems used for traffic collision avoidance, terrain awareness, autopilot, and other safety-critical features. It is also possible for such interference to result in false altitude reports with similar safety implications.

For these reasons, ASRI is concerned about outdoor use of the UWB system proposed by Piper which seeks to use most of the 4200-4400 MHz band for UWB radios on fixed infrastructure or transmissions by trains to fixed infrastructure. Piper tries to downplay the potential for interference from deployment of UWB ETLs systems operating under the proposed waiver by suggesting that, due to the intended operation, the waiver would not permit "a large-scale UWB communications

⁸ The AM(R)S allocation at 4.2-4.4 GHz is the only spectrum allowed for WAIC and was deliberately engineered to ensure aviation makes efficient and safe use of existing aeronautical safety allocations, i.e., the spectrum designated for radio altimeters. See ITU Radio Regulations, Resolution 424 (Rev.WRC-15) (setting forth conditions of compatibility with ARNS operations in the 4200-400 MHz band).

system “⁹. However, this broad contention glosses over the potential for interference from ETLS to authorized and licensed systems that operate near railroads where, for local purposes, the ELTS would in effect be a large scale UWB system.¹⁰ Indeed, it is common for both commuter and rail line trains to operate in the vicinity of an airport or near airports, increasing the risk of harmful interference to radio altimeter. Further, portions of outdoor track equipped with fixed ETLS transmitters may be at higher elevations above typical rail installations, causing UWB transmissions to propagate further, exacerbating the potential for harmful interference. Outside of the fixed wing aviation operations at airports, there are also portions of outdoor track the may coincide with helicopter operations.

A proper assessment of the potential for interference from the Piper UWB devices is needed in order to determine the impact to both the existing radio altimeter systems and the increasingly used WAIC. ASRI has previously raised concerns about impacts from outdoor infrastructure in another somewhat similar, still pending waiver request for certification for a UWB positive train control system filed by Metrom Rail, LLC (“Metrom”).¹¹ As is the case with Metrom, additional details are need from Piper in order to assess the impact on aviation systems. Specifically, ASRI requests the following information on the deployment of ETLS and related system parameters in order to assess any potential impact to aviation safety systems operating at 4200-4400 MHz:

- Transmitted signal power levels and characteristics.

⁹ See *Request* at 6.

¹⁰ The *Request* is somewhat unclear how densely fixed ETLS transmitters, which the *Request* refers to as “anchors,” would be located on the tracks. The *Request* simply states that such transmitters “are positioned at different distance intervals,” rendering it difficult to do a proper potential interference analysis. See *Request* at 4.

¹¹ See *Request by Metrom Rail, LLC for Waiver of Sections 15.519(a) and 15.519(c) of the Commission’s Rules*, Comments of Aviation Spectrum Resources, Inc., ET Docket No. 18-284 (filed October 22, 2018).

- Further information regarding the duty cycle(s) of the ETLS operations, including the duty cycle of the periodic system status signals.¹²
- Installation information for fixed ELTS transmitting stations.
- The expected density along rail lines of both fixed and mobile (i.e., equipped on rail cars) transmitting systems.
- The proximity of potential ELTS deployments to airports and known areas of aircraft operation in the takeoff, initial climb, approach, and landing phases of flight.
- How long the services deployed under this waiver would be operational.
- Whether other chipsets/waveforms are being or have been considered for use in the Piper ELTS system.

The foregoing information is needed to develop a composite scenario of harmful interference to better inform further analysis of the effects of interference on several industry standard altimeters as well as WAIC systems. The information provided with the Piper *Request* is not sufficient to develop such a composite scenario with an appropriate level of detail to be useful.

No matter what the outcome of any assessment based on the above information, if a waiver is granted in whole or in part to allow outdoor fixed infrastructure operation of the ETLS, the Piper radios should have a ‘stop buzzer’ function and Piper should be required, as a condition of any user’s operation, to ensure that such user provides Piper or another appropriate point of contact with a named point of contact that can be called immediately by potentially affected aircraft operators to have the ETLS operator turn off the system should interference from Piper’s radios be suspected.


¹² In the *Request*, Piper notes that the fixed infrastructure emits “periodic system status signals.” *Request* at 4, 8. Piper fails to state the duty cycle, the number of occurrences daily or at peak hours of train operation, or the length of transmissions. Piper does state that “the signals emitted by Piper’s UWB devices are very low power and operate at an EIRP of -41.3 dBm with a duty cycle of 0.6%.” *Id.* at 8. It is still unclear how this duty cycle was determined, given that the spacing of the fixed transmitters (or anchors) and train speed will be a factor in the transmissions and the duty cycle may vary over time.

III. CONCLUSION

Until the potential for interference to radio altimeters and WAIC systems operating at 4200-4400 MHz can be appropriately assessed, ASRI requests the decision on the waiver, at least with respect to the 4243-4743 MHz band, be put on hold. ASRI presently intends to reach out directly to Piper to discuss its concerns and verifying whether there are any other issues with aviation manufacturers. It is hoped these discussions can be concluded quickly and any required mitigations affecting the deployment of ELTS systems against the potential for harmful interference to radio altimeters and WAIC systems, if any, be identified and agreed upon by the manufacturer and aviation stakeholders.

Respectfully submitted,

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